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(54) Container fitment application

(57) A four-armed pour spout fitment applicator 12 rotates to bring two of its arms 32,34,36 and 38 into respective open-topped cartons 16 and then advances axially to apply flanged pour spout fitments 28 carried by those two arms outwardly through openings in carton top panels of the respective cartons 16, and to bring the other two arms ready to receive two additional fitments 28, which are transferred thereto by two air cylinders 42. External ultrasonic sealers have horns serving to engage the outer surfaces of the top panels to seal the flanges of the fitments 28 to the inner surfaces of the top panels around the openings.

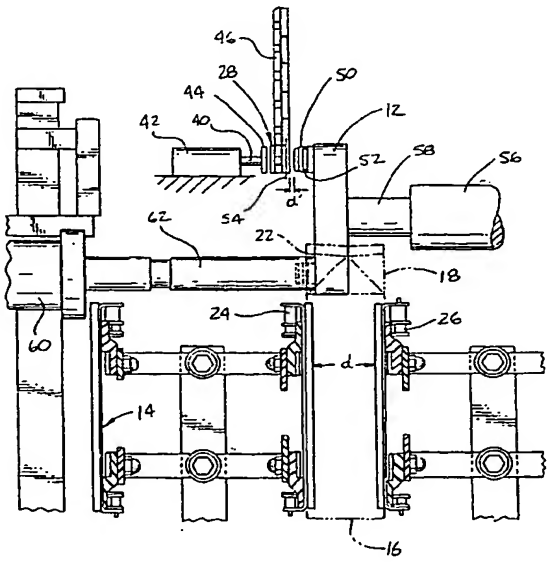

FIG - 2

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Description

This invention relates generally to apparatus including a container fitment applicator, especially to such applicators for use on carton forming, filling and sealing machines and, more particularly, to such machines in which pour spout fitments are applied while the cartons are being processed thereon.

Forming, filling and sealing machines having pour spout applicators at one of the stations therealong are known. For example, GB-A-2,238,287 discloses an application station at which a rotatable mandrel or bar is provided, with the mandrel having two bosses projecting therefrom. Shortly after one of the bosses has delivered a pouring spout to an opening through a panel of an open top of a carton, the other of the bosses takes a pouring spout from a spout-conveying arrangement, and vice-versa. In more detail, as a carton is indexed into the application station, the mandrel is rotated in the direction of the carton travel into the open top of the carton, aligning the spout-carrying boss with the opening formed in the selected panel of the top closure of the carton; the boss and pouring spout are moved laterally into the opening; the inner flanged end of the pouring spout is secured, such as by ultrasonic welding, to the inner wall around the opening; and the boss is withdrawn from the opening and then rotated out of the open top. An outer cap is attached to the pouring spout before assembly.

US-A-5,484,374 discloses an applicator including a rotatable and translatable anvil having three (or more or fewer) radially extending arms. A mandrel on one arm frictionally engages a pour spout fitment simultaneously with a second mandrel inserting a fitment into a container hole. The applicator relies upon the friction between the interior surface of the fitment and the closely-fitting first mandrel to overcome suction imparted through an aperture in an escapement holding the fitment to withdraw the fitment from the escapement. An ultrasonic sealer vibrates the container wall against the anvil to weld the fitment to the container. The applicator applies one fitment to one container at a time.

Other pouring spout applicators are disclosed in US-A-4,788,811 and US-A-4,386,923. US-A-4,788,811 discloses a horizontally elongated pour spout fitment attaching turret at a location upstream of the usual turret and radial mandrels on which the bottom end closure is folded and sealed. The fitment attaching turret includes a pusher at one station for pushing an open-ended package onto a sucker device holding and inserting a pour spout fitment into an opening in a package top panel. The fitment attaching turret is then rotated to a second station where an anvil is axially inserted into the package, co-operable with an ultrasonic horn for sealing a flange of the fitment to the inner surface of the top panel.

US-A-4,386,923 discloses a bag-in-box arrangement wherein a fitment is attached to the bag which is then inserted through a hole in a flap of the box, while both are in the collapsed or blank state.

Each of US-A-5,267,934 and US-A-5,435,803 discloses pour spout fitment applicators wherein the fitment is applied from within the carton, outwardly through an opening therein.

According to one aspect of the present invention, there is provided apparatus for use in applying fitments to respective containers, comprising an applicator comprising a plurality of arms distributed round an axis, each arm having in a distal end zone thereof receiving means adapted to receive a fitment, and driving means for rotating said applicator so as angularly to position each arm to receive a fitment and later angularly to position the arm ready for applying of the fitment to the container, characterized in that said arms comprise first, second, third and fourth arms, and said driving means is arranged to rotate said applicator so as angularly to position the first and second arms carrying respective first and second fitments ready for concurrent applying of the first and second fitments to respective first and second containers and so as angularly to position the third and fourth arms to receive respective third and fourth fitments.

According to another aspect of the present invention, there is provided a method of applying fitments to containers, comprising turning an applicator including a plurality of arms so as to bring receiving means of one of the arms to a receiving position to receive a fitment, causing the receiving means to receive the fitment, further turning the applicator to bring the receiving means and thus the fitment to a delivering position to deliver the fitment, and applying the delivered fitment to a container, characterized in that the further turning of the applicator brings first and second receiving means of first and second arms of the applicator to respective delivering positions for first and second fitments and brings third and fourth receiving means of third and fourth arms of the applicator to respective receiving positions for third and fourth fitments, the first and second fitments are applied concurrently to first and second containers, and the third and fourth fitments are received by the third and fourth receiving means.

Owing to these aspects of the invention, it is possible to provide improved application of fitments to containers on a packaging machine, particularly a carton forming, filling and sealing machine, on which containers are indexed in groups.

The invention is particularly applicable to circumstances where containers aligned with the applicator are closely arrayed.

According to a further aspect of the present invention, there is provided apparatus for use in applying fitments to containers, comprising an applicator having at least two arms distributed about an axis and each having in a distal end zone thereof receiving means to receive and carry a fitment, and driving means arranged to rotate said applicator to cause one arm carrying one fitment to align said one fitment with one container while

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placing the receiving means of another arm in position to receive another fitment from an adjacent track, and also arranged to move the applicator axially to apply said one fitment to said one container and to bring the receiving means of said other arm to a position a predetermined distance from said other fitment, characterized by placing means for engaging said other fitment and moving said other fitment from said track to said other arm.

According to a yet further aspect of the present invention, there is provided a method of applying fitments to containers, comprising turning an applicator including a plurality of arms so as to bring one receiving means of one of the arms to a receiving position to receive one fitment, placing said one fitment on said one receiving means, further turning the applicator to bring said one receiving means and thus said one fitment to a delivering position to deliver said one fitment, applying said one fitment to one container, and placing another fitment onto another receiving means of another of said arms, characterized in that said placing of said other fitment is performed by moving said other fitment onto said other receiving means.

Owing to these aspects of the present invention, it is possible to place the fitments positively on the receiving means and so ensure that the fitments are reliably and correctly received by the applicator.

In a preferred embodiment, the apparatus includes a four-armed pour spout fitment applicator which rotates two of its arms into open-topped cartons and applies two flanged pour spout fitments outwardly through openings in a pair of top panels of a pair of adjacent cartons, while its other two arms are positioned to receive two other fitments. A pair of pneumatic piston-and-cylinder devices serve to transport the two other fitments to the other two arms and positively place the same thereon. An external ultrasonic sealer includes a horn which serves to engage the outer panel surfaces to seal the flanges of the fitments to the inner surfaces of the top panels around the openings while the pair of piston-and-cylinder devices are being actuated.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 is a side elevation of a double indexing, forming, filling and sealing machine;
Figure 2 is an enlarged side elevation of a pour spout fitment application station of the machine;
Figure 3 is a schematic, side elevational representation of fifteen operational stages at the station;
Figure 4 is a perspective view of a pour spout fitment applicable at the station; and
Figure 5 is a perspective view of a package produced by the machine.

Referring to the drawings, Figures 1 and 2 illustrate a forming, filling and sealing machine 10 embodying a pour spout fitment applicator 12, and including a conveyor 14 carrying thermoplastics-coated cartons 16 having open top closures 18. An opening 20 (see Figures 3 and 5) is formed in a selected panel 22 of each end closure 18. The applicator 12 is mounted on the machine 10 intermediate the usual indexable turret mechanism T including a plurality of mandrels M and a filling station including a source S of a selected liquid product.

As shown in Figure 2, the conveyor 14 comprises two endless chains 24 and 26 spaced a predetermined distance d apart, within which a series of closely spaced-apart cartons 16 are carried, with the panel 22 bearing the opening 20 facing toward one chain 24.

As seen in Figure 3, the pour spout fitment applicator 12 is positioned to receive two pour spout fitments 28 at a time on its two exposed arms 32 and 34 at stage 101, while two fitments on its two inner arms 36 and 38 are positioned for placement, as will be explained, into two top panels 22 of adjacent cartons 16 and 16a during a dwell while being conveyed by the double indexing conveyor 14 (Figure 2). As the conveyor 14 moves through stages 102 to 106, the arm 32 will rotate toward and into carton 16B. During further movement of the conveyor 14 through stages 107 to 110, the arm 34 rotates into carton 16C. During further movement through stages 111 to 115, the arms 32 and 34 will become aligned with the openings 20 in the top panels 22 of the cartons 16B and 16C for placement of two fitments 28 therein, with the arms 36 and 38 now being in the location for receiving two more fitments 28 for the next cycle.

As shown in Figure 3, the arm 32 has rotated through 180° for the cycle from stage 101 to stage 115. Its next 180° rotation will bring the arm 32 back to the stage 101 position, to receive its next pour spout fitment 28. It has been determined, in the example shown, that each carton 16 has indexed through a distance of 7.0 inches (17.78cm.) for a quart processing machine, or 9.0 inches (22.86cm.) for a half-gallon processing machine, in moving from stage 101 to stage 115, along the conveyor 14.

Referring once again to Figure 2, each of two tracks 46 in the form of chutes presents a pour spout fitment 28 at a spacing d' from an aligned, extension-type receiver or spigot 50 of one of the arms of the applicator 12. A piston 40 of a suitable, pneumatic, piston-and-cylinder device 42, having a flanged end 44, which, for some fitment sizes, may include a cylindrical shape for surrounding the fitment 28, serves to push each end fitment from the track 46 onto the spigot 50 of the applicator arm. Each spigot 50 has an elastomeric ring 52 therearound which will assume an interference fit in the inner periphery of the flanged end of the fitment 28.

Each track 46 extends vertically downwardly at the end thereof to terminate adjacent the applicator 12 and is adapted to hold a row of pour spout fitments 28, each having a flange 54 thereon slidably aligned end-to-end in the track, as received from suitable external loading

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means. Such loading means may include a vibratory parts feeder (not shown), known to have been available from Syntron Co., Homer City, State of Pennsylvania, United States of America. Such a parts feeder automatically orients a load of flanged fitments 28 and feeds them in their oriented attitude to each track 46. A pair of tracks may extend from one parts feeder bowl, or from a pair of feeder bowls.

The flange 54 of the fitment 28 is confined within the edges of the track 46, illustrated diagrammatically in Figure 2, and is snapped outwardly therefrom upon the fitment being pushed by the flanged end 44 of the piston 40.

A drive unit, represented as 56, is connected by a shaft 58 to the centre of the applicator 12. The drive unit 56 is adapted to reciprocate the applicator 12 within the distance d, and to rotate the applicator through repeated 180° cycles shown in Figure 3.

While moving laterally to place two fitments 28 into two openings 20 in two adjacent panels 22 from the arms 36 and 38, the two arms 32 and 34 extend toward two other fitments 28 in the two adjacent tracks 46, stopping the distance d' away therefrom to await the conveyance of the fitments by the pistons 40 and ends 44.

The application station includes two ultrasonic sealers 60 (Figure 2), each including a retractable horn 62 having an axis aligned with the opening 20 through the panel 22. As the applicator 12 places the two fitments 28 into two openings 20, the two vibrating horns 62 engage the outer surfaces of the two panels 22, opposite the flanges 54, thereby to bond the flanges to the inner surfaces of the two panels. While the bonding process is being accomplished, the ends 44 engage the two adjacent fitments 28 and convey them across the spacing d' and slide them onto the two spigots 50.

The horns 62 and the applicator 12 then retract to begin the next cycle.

It should be apparent that there has been described with reference to the drawings an improved carton pour spout fitment applicator that is co-operable with a double indexing conveyor of a high-production, forming, filling and sealing machine.

It should be further apparent that, for a machine which indexes closely arrayed cartons two at a time along one path, only one applicator is employed to serve two adjacent cartons. For such a machine, there would be a dual-mandrel turret, or a single-mandrel turret and a single-to-dual indexing carton transfer mechanism 64 as shown in Figure 1, and as disclosed in US-A-4,456,118, with, of course, downstream multiple breakers, fillers, folders and sealers.

It should also be apparent that the placing means 40-44 is usable with an applicator with either two or three arms instead of the four arms described above.

It should be still further apparent that the placing means 40-44 positively applies pour spout fitments to spigots, in contrast to an applicator which depends upon only a friction fit of a spigot first to insert into and then to pull a fitment from a stationary escapement.

Claims

1. Apparatus for use in applying fitments to respective containers, comprising an applicator (12) comprising a plurality of arms (32-38) distributed round an axis (58), each arm (32-38) having in a distal end zone thereof receiving means (50) adapted to receive a fitment (28), and driving means (56) for rotating said applicator (12) so as angularly to position each arm (32-38) to receive a fitment (28) and later angularly to position the arm (32-38) ready for applying of the fitment (28) to the container (16), characterized in that said arms (32-38) comprise first, second, third and fourth arms (32-38), and said driving means (56) is arranged to rotate said applicator (12) so as angularly to position the first and second arms (32,34) carrying respective first and second fitments (28) ready for concurrent applying of the first and second fitments (28) to respective first and second containers (16B,16C) and so as angularly to position the third and fourth arms (36,38) to receive respective third and fourth fitments (28).

2. Apparatus according to claim 1, wherein said driving means (56) serves also to reciprocate said applicator (12) to apply said first and second fitments (28) concurrently to said first and second containers (16B,16C).

3. Apparatus according to claim 1 or 2, and further comprising fixing means (62) for fixing said first and second fitments (28) concurrently to said first and second containers (16B,16C), respectively.

4. Apparatus according to claim 3, wherein said fixing means (62) comprises ultrasonic means (62) for bearing on an outer surface around each of said first and second fitments (28) to bond respective flanges (54) of said first and second fitments (28) concurrently to the first and second containers (16B,16C).

5. Apparatus according to any preceding claim, and further comprising placing means (40-44) for placing said third and fourth fitments (28) onto the receiving means (50) of said third and fourth arms (36,38).

6. Apparatus according to claim 5, wherein said placing means (40-44) comprises fixed cylinders (42) each having a reciprocal piston (40) for alignment with a corresponding receiving means (50).

7. Apparatus according to claim 5 or 6 as appended to claim 3, wherein said placing means (40-44) is arranged to displace said third and fourth fitments

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(28) to said third and fourth arms (36,38) in a timed relationship with the fixing of said first and second fitments (28) to said first and second containers (16B,16C).

8. A method of applying fitments to containers, comprising turning an applicator (12) including a plurality of arms (32-38) so as to bring receiving means (50) of one of the arms (32-38) to a receiving position to receive a fitment (28), causing the receiving means (50) to receive the fitment (28), further turning the applicator (12) to bring the receiving means (50) and thus the fitment (28) to a delivering position to deliver the fitment (28), and applying the delivered fitment (28) to a container (16), characterized in that the further turning of the applicator (12) brings first and second receiving means (50) of first and second arms (32,34) of the applicator (12) to respective delivering positions for first and second fitments (28) and brings third and fourth receiving means (50) of third and fourth arms (36,38) of the applicator (12) to respective receiving positions for third and fourth fitments (28), the first and second fitments (28) are applied concurrently to first and second containers (16B,16C), and the third and fourth fitments (28) are received by the third and fourth receiving means (50).

9. A method according to claim 8, and further comprising reciprocating said applicator (12) in order to apply said first and second fitments (28) as aforesaid.

10. A method according to claim 8 or 9, and further comprising, after applying said first and second fitments (28) as aforesaid, fixing said first and second fitments (28) concurrently to said first and second containers (16B,16C).

11. A method according to claim 10, wherein said third and fourth fitments (28) are received on said third and fourth receiving means (50) as aforesaid concurrently with said fixing.

12. A method according to any one of claims 8 to 11, wherein said first and second arms (32,34) turn into open tops of the first and second containers (16B, 16C), and said third and fourth arms (36,38) turn into open tops of third and fourth containers (16,16A).

13. Apparatus for use in applying fitments to containers, comprising an applicator (12) having at least two arms (32-38) distributed about an axis (58) and each having in a distal end zone thereof receiving means (50) to receive and carry a fitment (28), and driving means (56) arranged to rotate said applicator (12) to cause one arm (32) carrying one fitment (28) to align said one fitment (28) with one container (16B) while placing the receiving means of another arm (36) in position to receive another fitment (28) from an adjacent track (46), and also arranged to move the applicator (12) axially to apply said one fitment (28) to said one container (16B) and to bring the receiving means (50) of said other arm (36) to a position a predetermined distance (d') from said other fitment (28), characterized by placing means (40-44) for engaging said other fitment (28) and moving said other fitment (28) from said track (46) to said other arm (36).

14. Apparatus according to claim 13, and further comprising fixing means (62) for fixing said one fitment (28) to said one container (16B), said placing means (40-44) being arranged to move said other fitment (28) from said track (46) to said other arm (36) in a timed relationship with the fixing of said one fitment (28) to said one container (16B).

15. Apparatus according to claim 13 or 14, wherein said placing means (40-44) includes a piston (40) having end means (44) for abutting against a body of said other fitment (28) and causing a flange (54) on said body to snap out of said track (46) and move through said predetermined distance (d') to mount said other fitment (28) slidably onto the receiving means (50) of said other arm (36).

16. A method of applying fitments to containers, comprising turning an applicator (12) including a plurality of arms (32-38) so as to bring one receiving means (50) of one (32) of the arms (32-38) to a receiving position to receive one fitment (28), placing said one fitment (28) on said one receiving means (50), further turning the applicator (12) to bring said one receiving means (50) and thus said one fitment (28) to a delivering position to deliver said one fitment (28), applying said one fitment (28) to one container (16B), and placing another fitment (28) onto another receiving means (50) of another (36) of said arms (32-38), characterized in that said placing of said other fitment (28) is performed by moving said other fitment (28) onto said other receiving means (50).

17. A method according to claim 16, and further comprising, after said applying, fixing said one fitment (28) to said one container (16B), said placing of said other fitment (28) being performed in a timed relationship with said fixing.

18. A method according to claim 17, wherein said applying is performed by axially advancing said applicator (12), and said applicator (12) is axially retracted following said fixing.

19. A method according to claim 17 or 18, wherein said

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placing and said fixing are concurrent.

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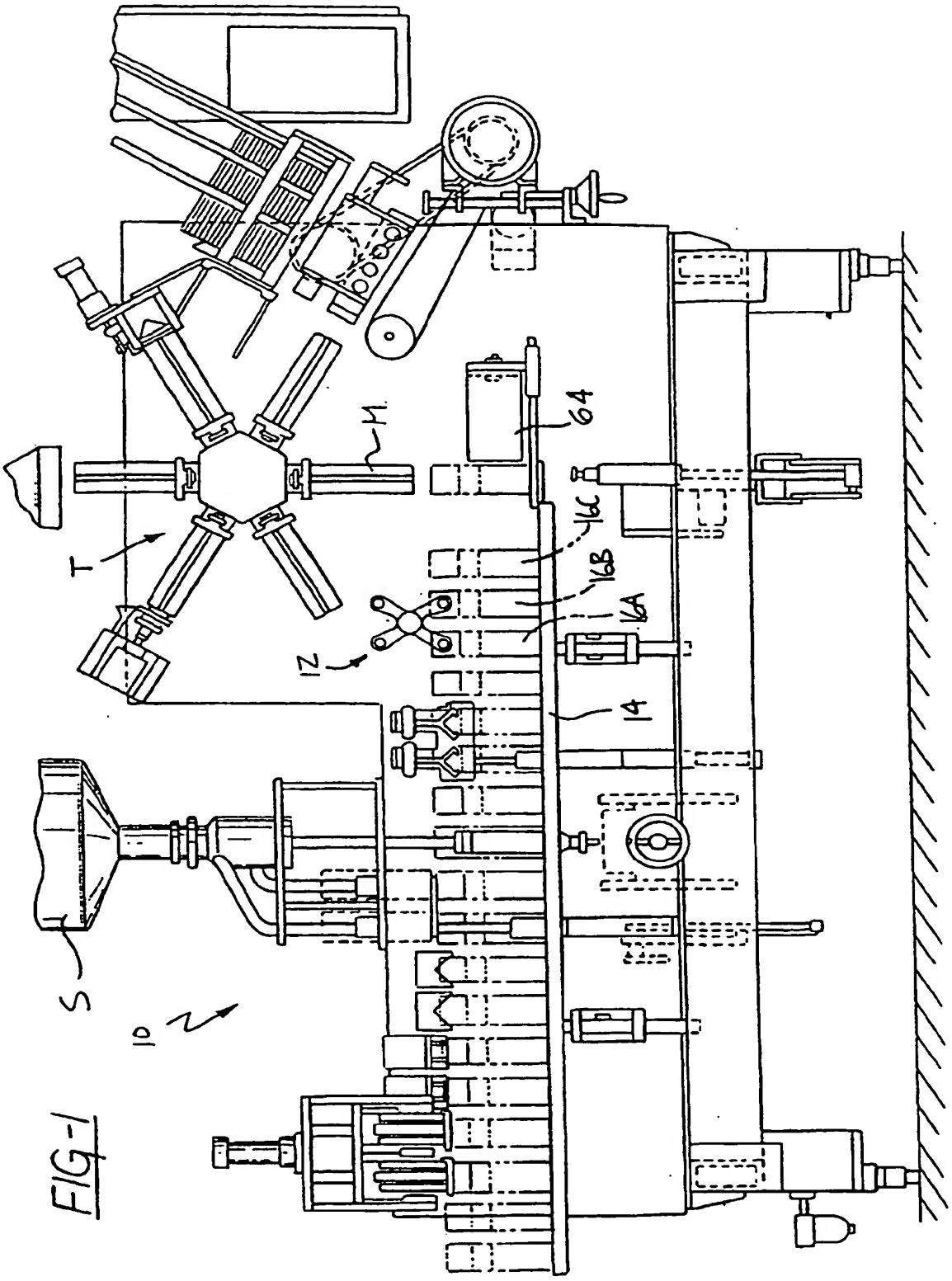

FIG-1

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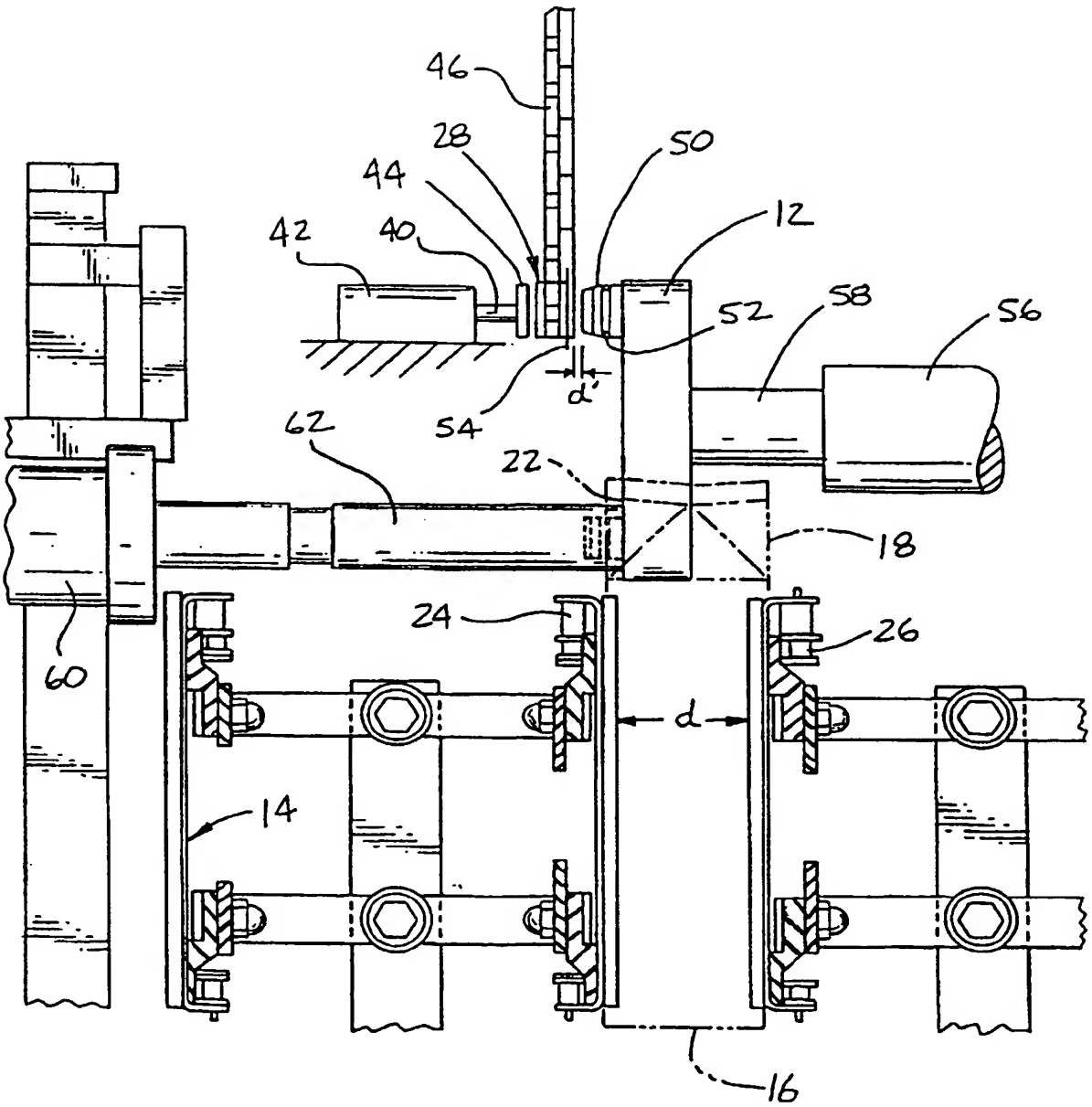

FIG - 2

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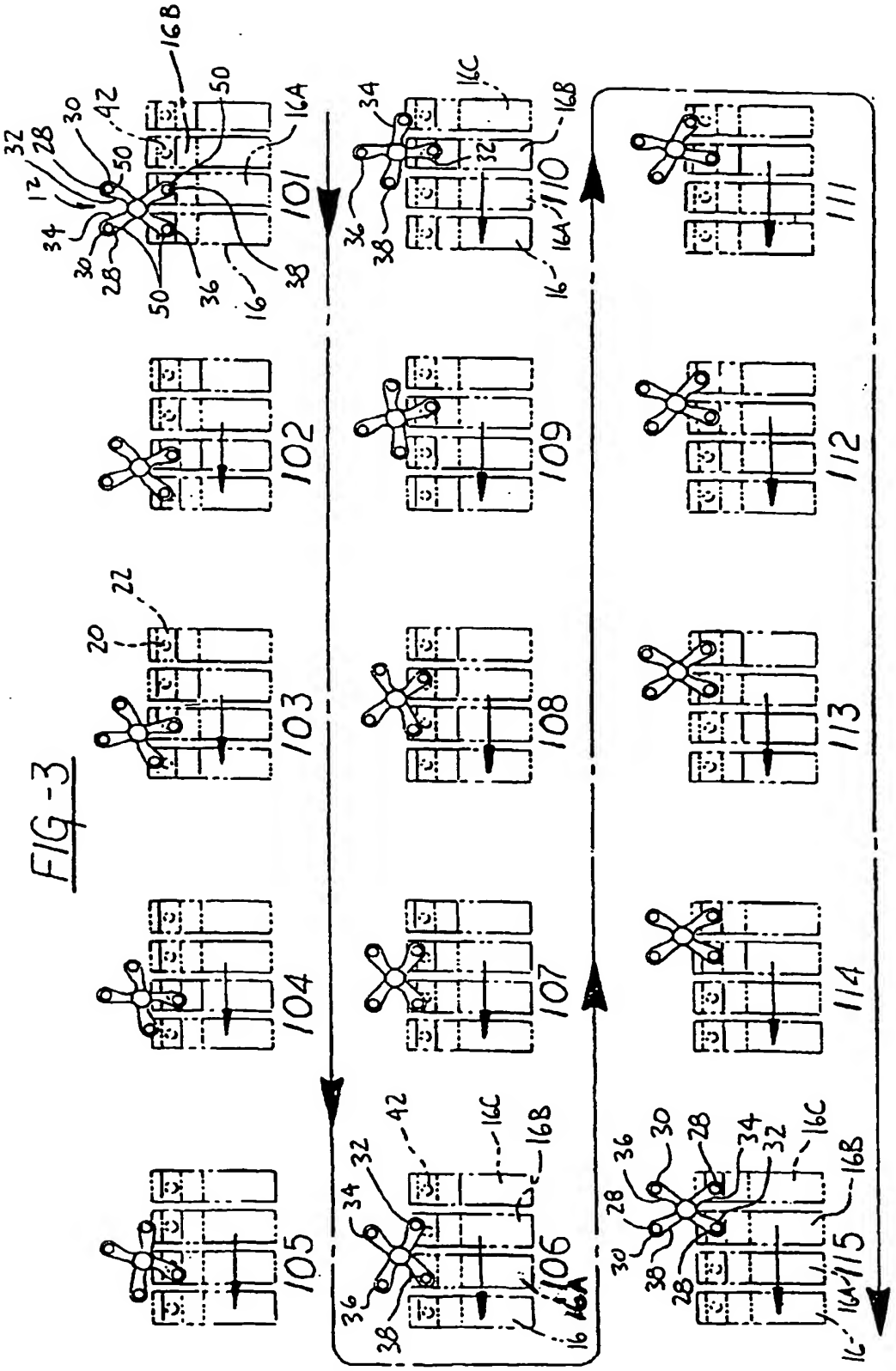

FIG-3

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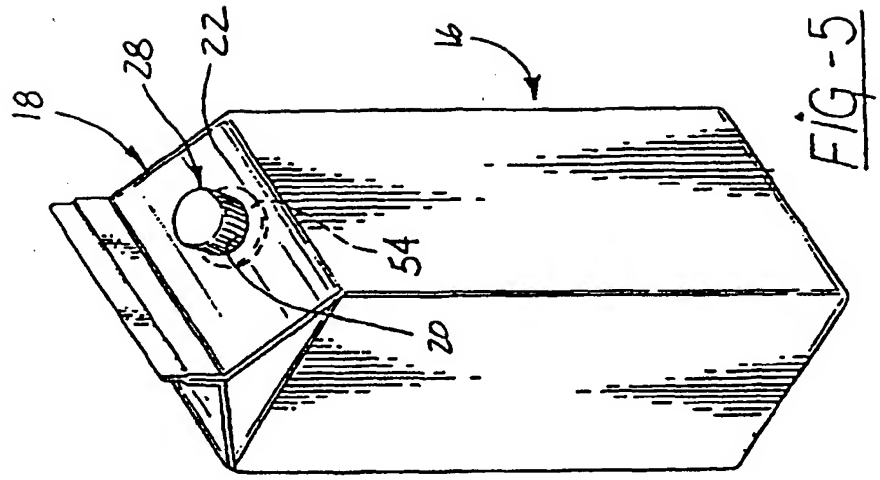
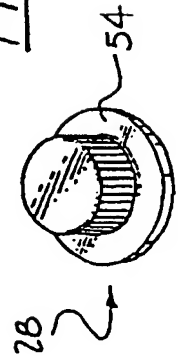


FIG-5

FIG-4



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(54) Container fitment application

(57) A four-armed pour spout fitment applicator 12 rotates to bring two of its arms 32,34,36 and 38 into respective open-topped cartons 16 and then advances axially to apply flanged pour spout fitments 28 carried by those two arms outwardly through openings in carton top panels of the respective cartons 16, and to bring the other two arms ready to receive two additional fitments 28, which are transferred thereto by two air cylinders 42. External ultrasonic sealers have horns serving to engage the outer surfaces of the top panels to seal the flanges of the fitments 28 to the inner surfaces of the top panels around the openings.

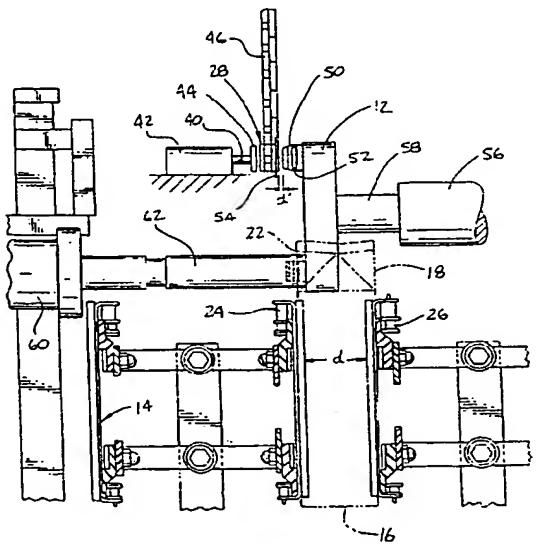

FIG - 2

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 4990

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	WO 95 10408 A (PORTOLA PACKAGING) 20 April 1995 * the whole document *	13,14, 16-19	B65B61/18 B31B1/84
Y		15	
A		5-7	

Y	US 5 473 857 A (D.E. KEELER) 12 December 1995 * column 5, line 40-47; figure 2 *	15	

A,D	US 5 484 374 A (BACHNER ET AL.) 16 January 1996 * the whole document *	1-4,8-11	

A	US 3 812 572 A (R.J. WEIKERT) 28 May 1974 * column 5, line 56 - column 6, line 2; figure 1 *	1,8	

A	WO 96 10515 A (PORTOLA PACKAGING) 11 April 1996 * page 7, line 1-20 * * page 9, line 33-35; figures 2,4 *	13-18	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
B65B B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 January 1998	Grentzius, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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European Patent Office

Application Number
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

SEE SHEET B
(In case of Lack of Unity)

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 97 30 4990

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-12

   Apparatus and method for use in applying fitments to respective containers using a four-armed pour spout fitment applicator.

2. Claims: 13-19

   Apparatus and method for use in applying fitments to respective containers using placing means for moving a fitment from a track to an applicator arm.

The independent claims 1 and 8 of the first invention differ from what is disclosed in US 5484374 A, which is considered to represent the closest prior art, by the characterizing features indicated above, which permit to apply fitments to containers which are indexed in groups.

The independent claims 13 and 16 of the second invention differ from the disclosure of US 5484374 by their characterizing features as indicated above, whereby fitments can be placed positively on the receiving means.

Accordingly the two inventions identified above involve different special technical features solving unrelated technical problems. Therefore there is no technical relationship among these inventions in the sense of Rule 30 EPC, so that the requirement of unity of invention (Art. 82 EPC) is not fulfilled.

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US006085489A

United States Patent [19]

Bachner et al.

[11] Patent Number: 6,085,489

[45] Date of Patent: Jul. 11, 2000

[54] SPOUT MANDREL WITH ENERGY RING

[75] Inventors: Jerry G. Bachner, Algonquin; Michael A. Kipp, Bartlett, both of Ill.

[73] Assignee: NIMCO Corporation, Crystal Lake, Ill.

[21] Appl. No.: 09/102,456

[22] Filed: Jun. 22, 1998

[51] Int. Cl.[7] B32B 31/16; B65B 51/22; B65B 61/00

[52] U.S. Cl. 53/410; 53/133.2; 53/DIG. 2; 493/87; 156/580.2

[58] Field of Search 493/87; 53/133.2, 53/DIG. 2, 410, 412, 416; 156/580.2, 580.1, 73.1

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Primary Examiner—James F. Coan
Attorney, Agent, or Firm—Jenner & Block

[57] ABSTRACT

An applicator attaches spouts and other fitments to paperboard cartons and the like in automated packaging equipment. The applicator features a rotatable and translatable anvil housing having a plurality of radially extending lobes, each lobe having an anvil thereon, said anvil having an energy ring thereon to facilitate ultrasonic attachment of the spout to the carton. A mandrel or other engagement mechanism on each lobe engages and holds spouts for attachment to a container. The anvil inserts a spout into a container hole, and an ultrasonic sealer ultrasonically vibrates the carton wall against the energy ring of the anvil to weld the spout to the carton.

15 Claims, 8 Drawing Sheets

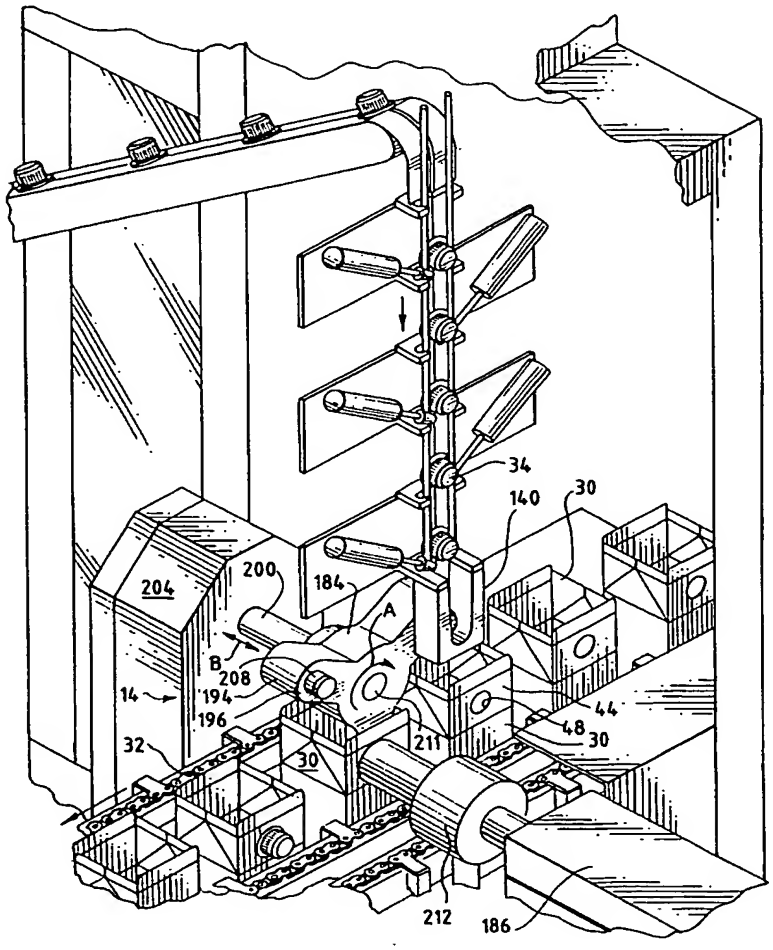

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FIG. 1

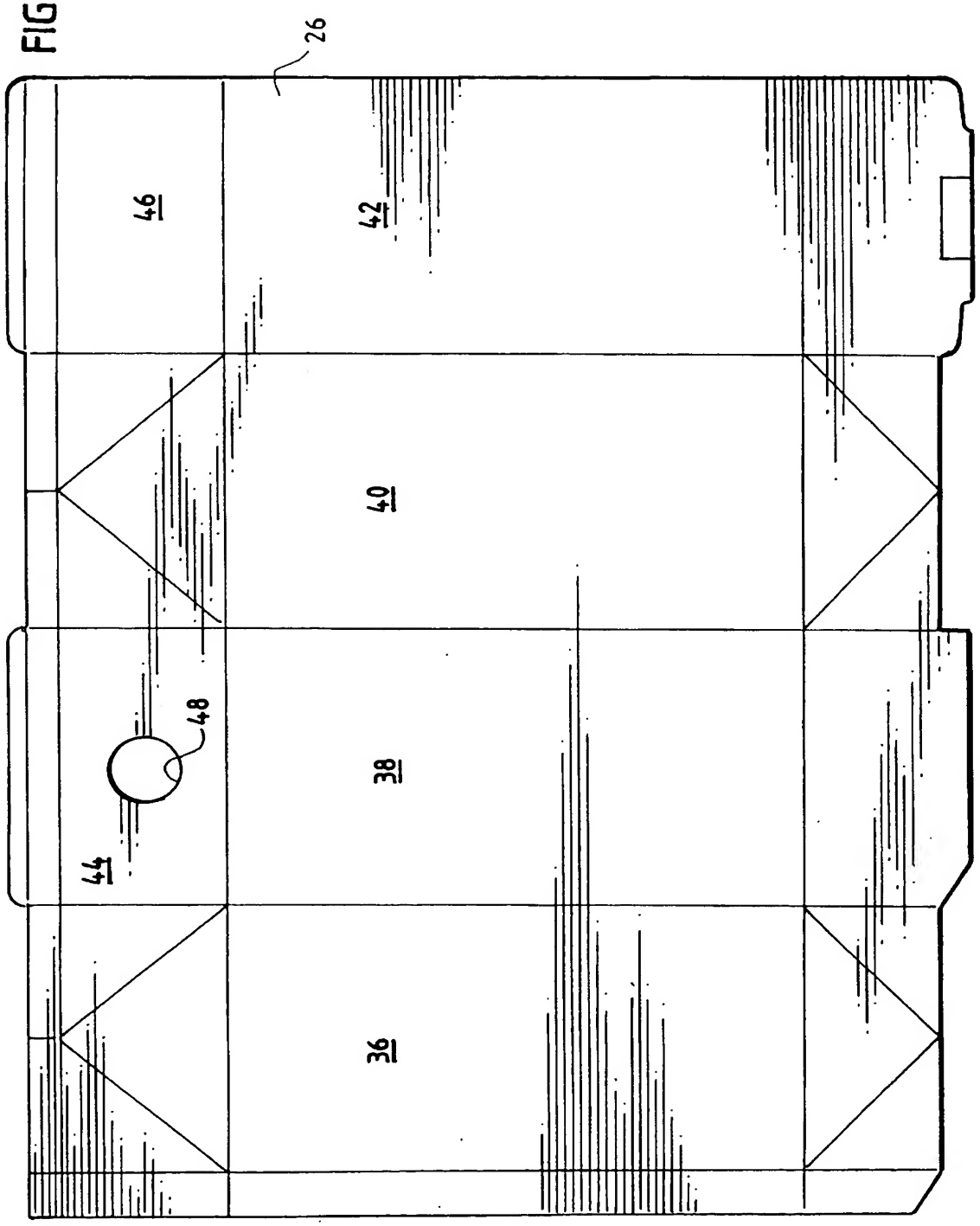

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FIG. 2

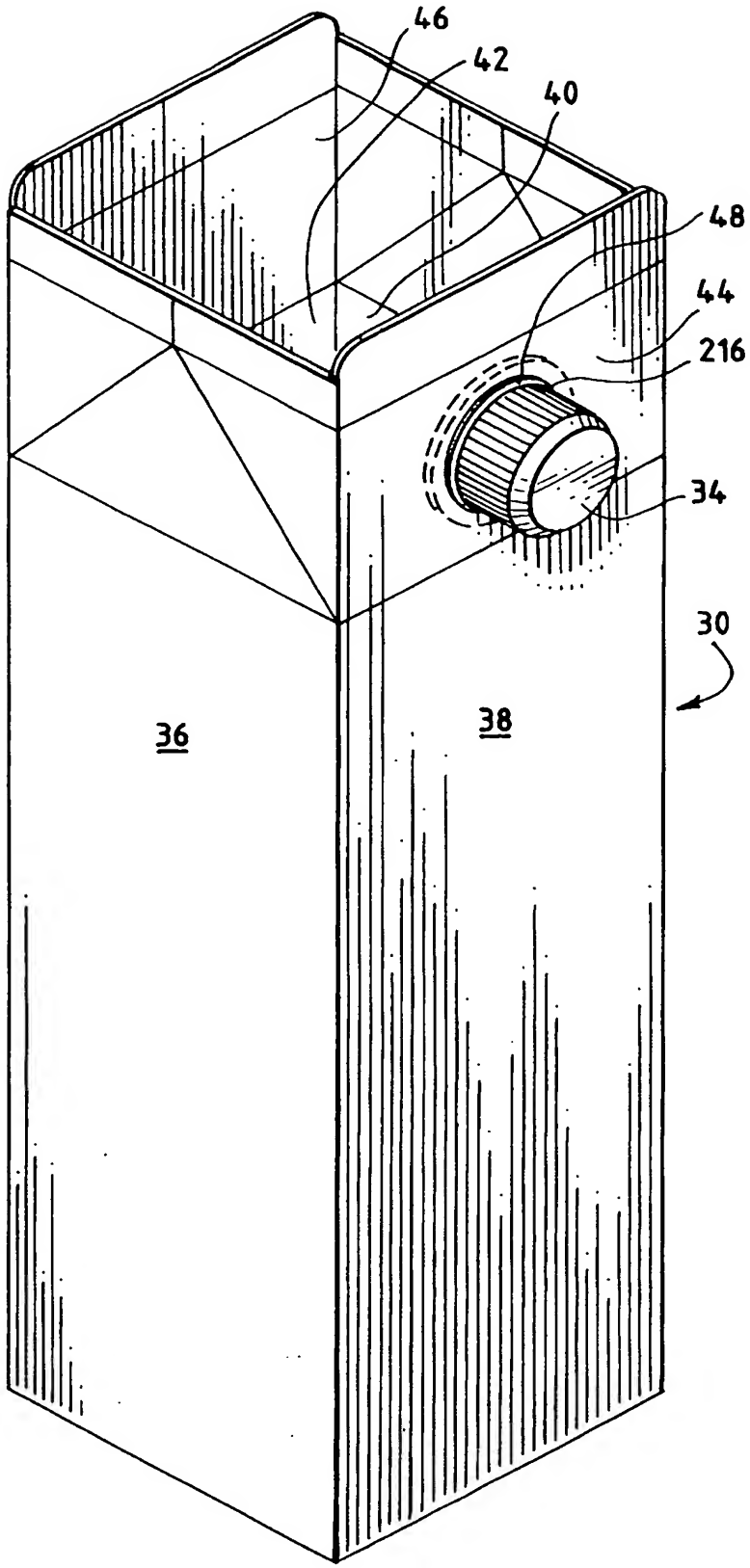

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FIG. 3

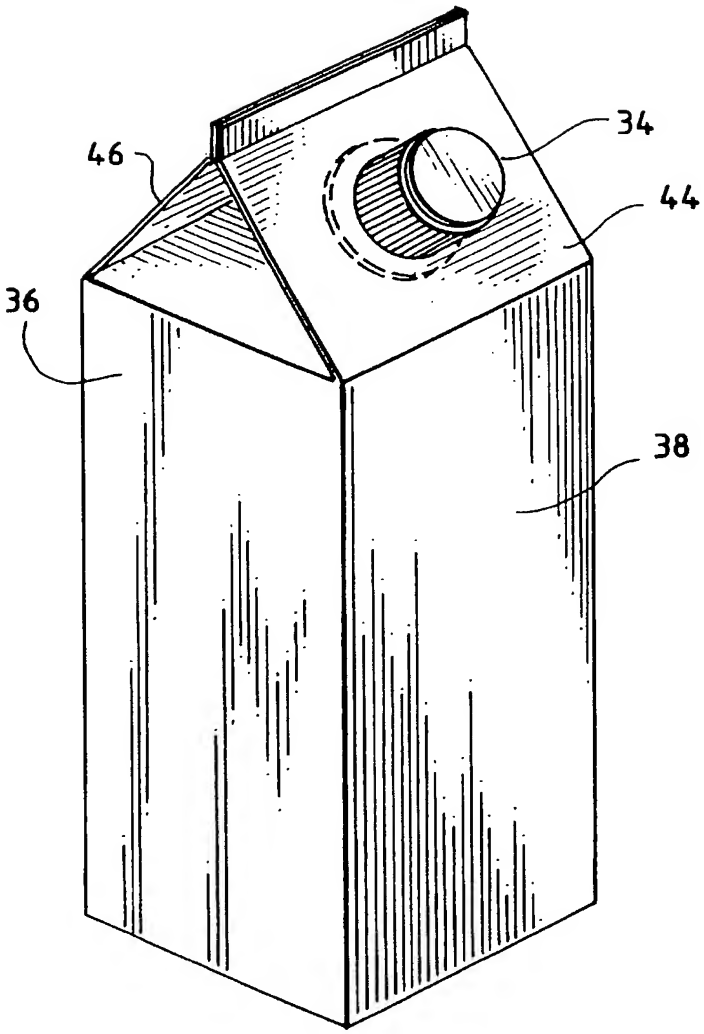

FIG. 4

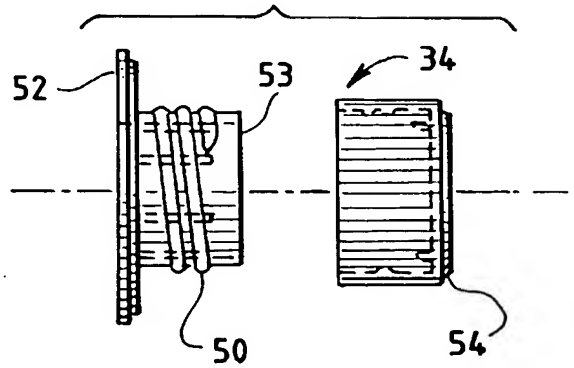

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FIG. 5

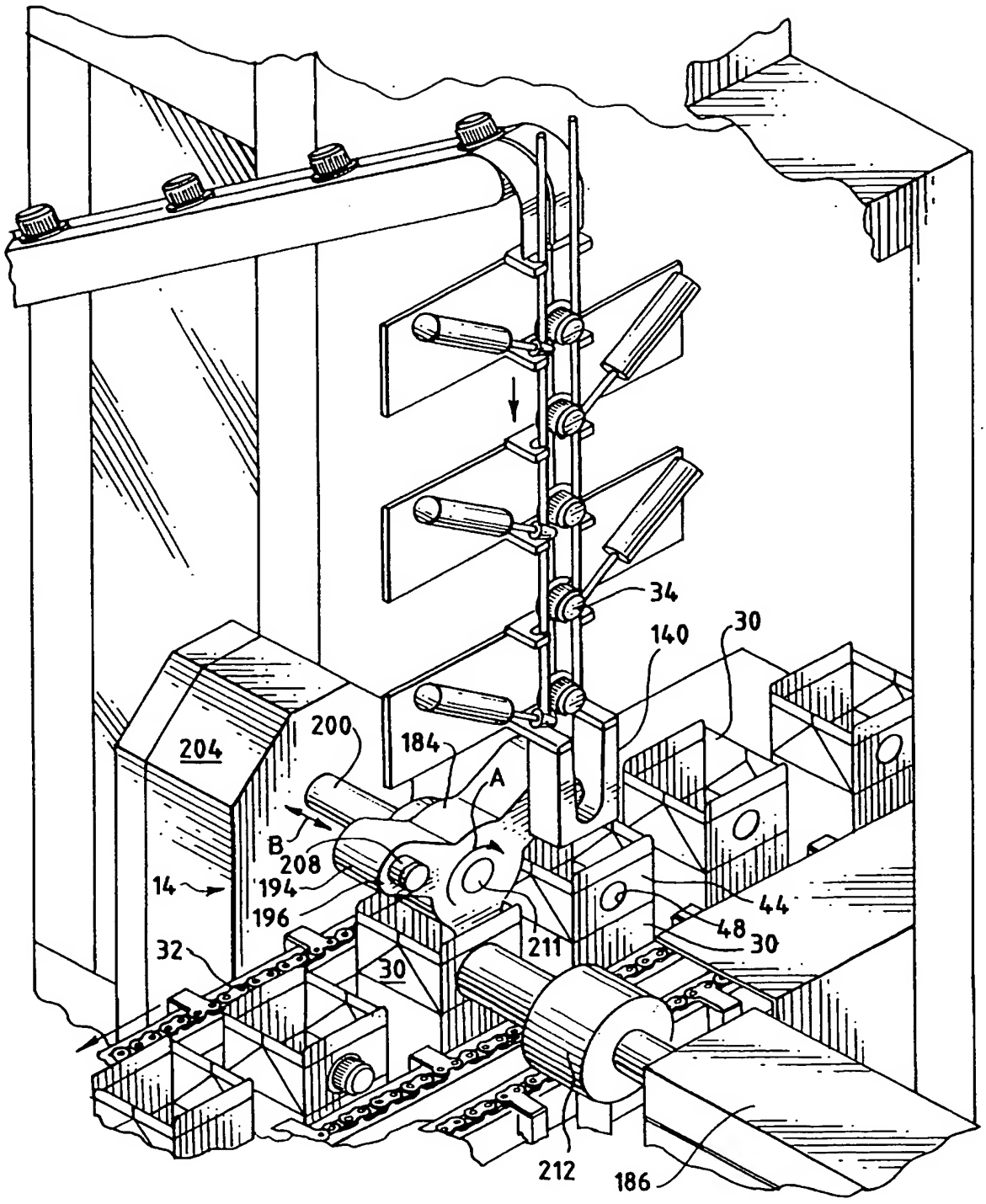

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FIG. 6

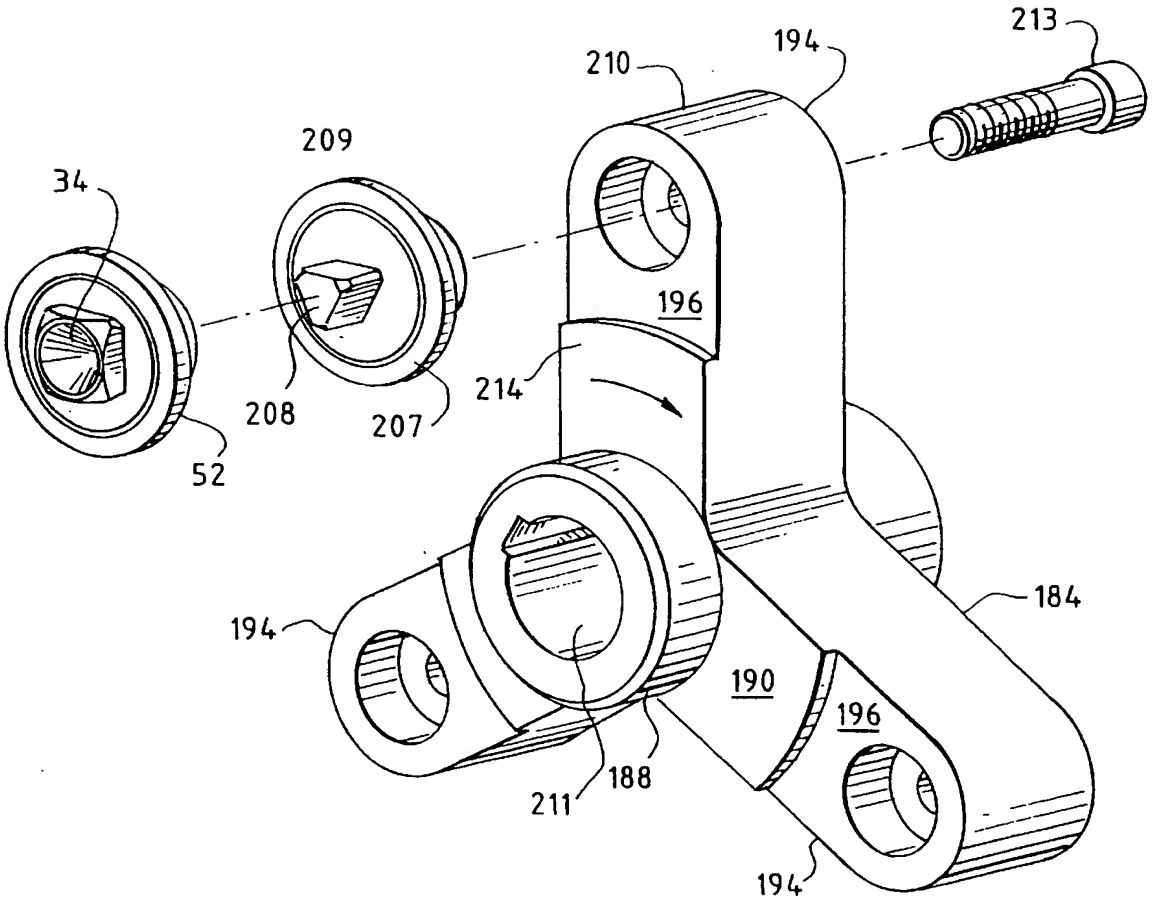

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FIG. 7

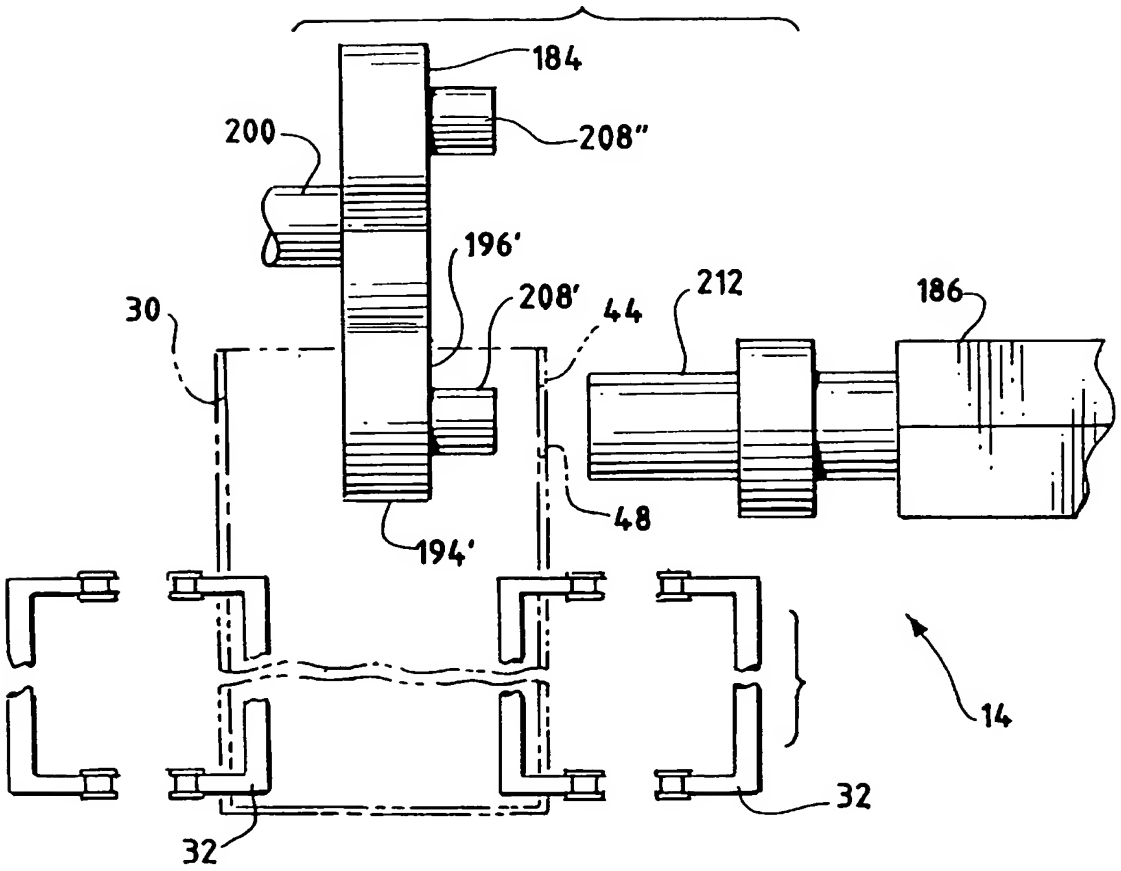

FIG. 8

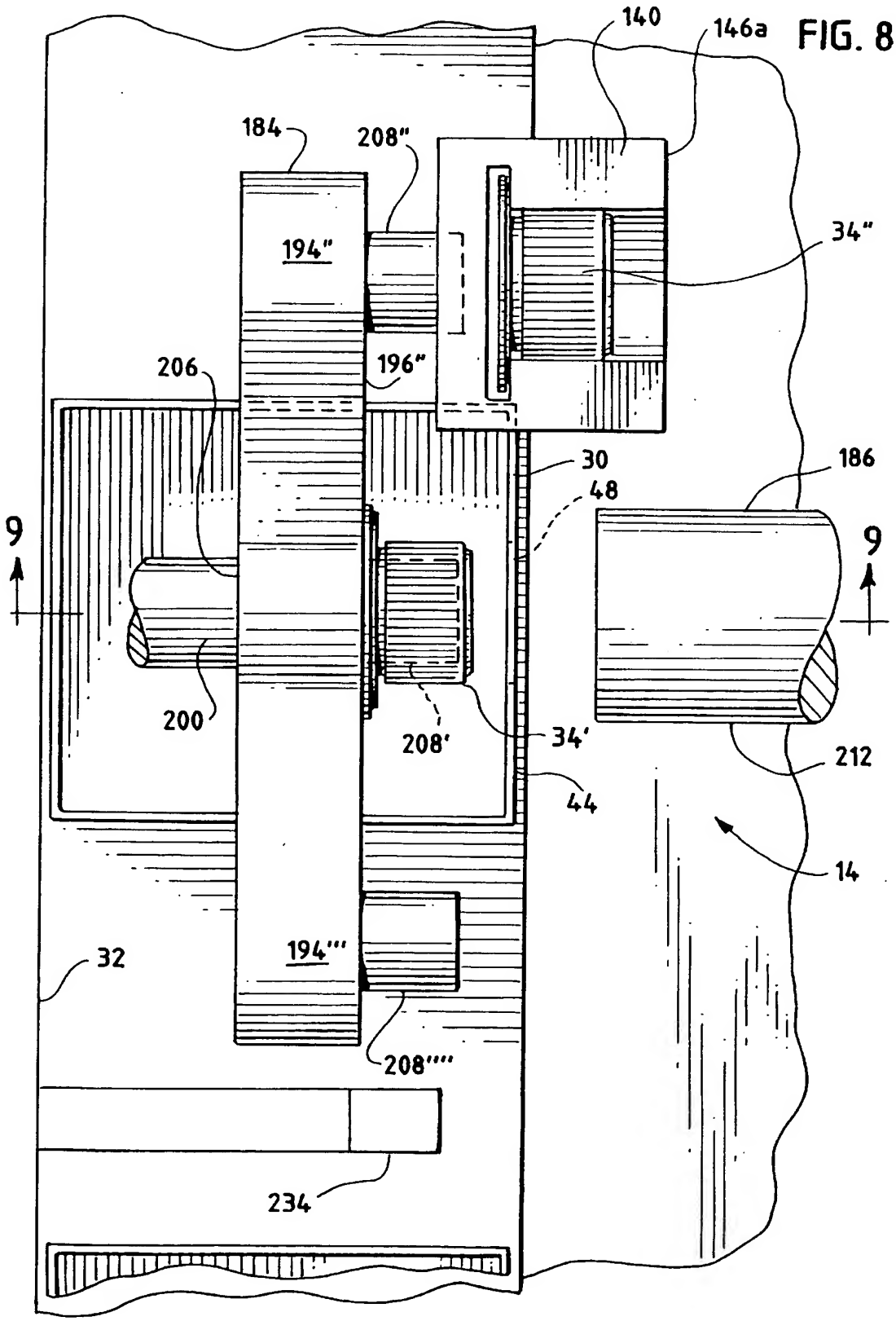

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FIG. 9

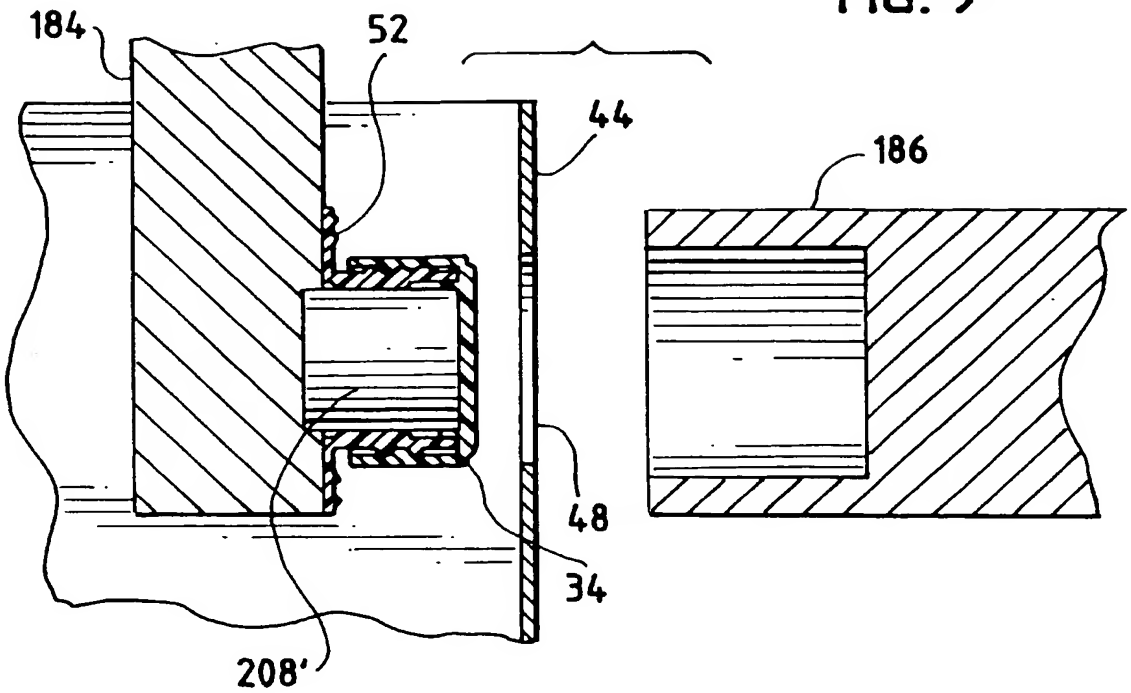
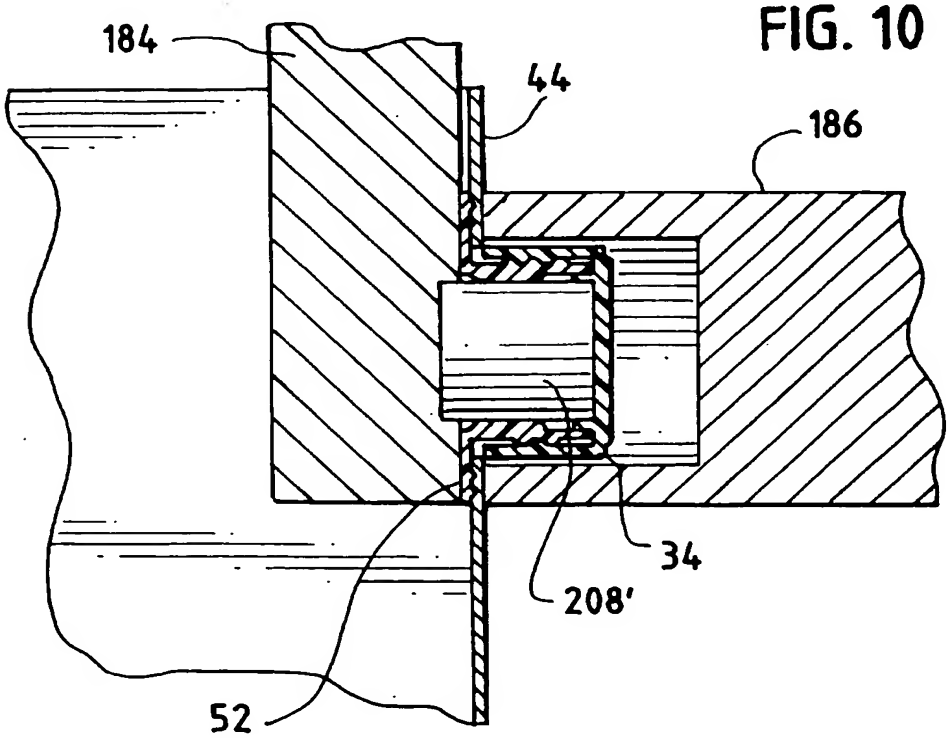


FIG. 10



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SPOUT MANDREL WITH ENERGY RING

FIELD OF THE INVENTION

The invention relates to machinery for attaching reclosable spouts to containers, such as paperboard cartons used for holding liquids and solids and the like, and, more particularly to ultrasonic welding devices employing an energy ring.

BACKGROUND OF THE INVENTION

A common and useful type of container is the paperboard carton having a gabled top. Examples of such cartons include the everyday milk carton. In recent years, these cartons have been used for numerous other products, including foods, beverages and detergents. These cartons are typically coated or laminated with a heat-sealable plastic, which is used by manufacturers to seal the cartons.

Typically, the contents of these cartons are dispensed by ripping open the gable top and unfolding a pourable spout. Once the carton is ripped open, it cannot be tightly resealed. To address this problem, cartons have been devised with reclosable spouts. These spouts are also referred to in the field as fitments, closures and caps. For convenience, they are referred to herein as "reclosable spouts."

A conventional spout is opened and closed by means of a removable cap, snap, hatch or the like. In the case of a capped spout, a person using the carton removes the cap to dispense the contents of the carton (typically a beverage). Because the carton has not been torn open, the contents can be tightly resealed.

Cartons having reclosable spouts are typically manufactured with automatic machinery (often referred to as "packaging machinery") which forms the carton from a flat piece (or "blank") of paperboard or other suitable material. After the carton has been partially formed (but not filled or sealed), the reclosable spout is attached. A typical spout consists of a plastic cylinder having a mounting flange at one end and a threaded, removable cap (or other conventional closure) at the other. The spout is mounted from inside the carton through a preformed hole formed in the paperboard blank so that the capped end extends outward, while the flange is flush against the interior side of the carton wall. The flange is then ultrasonically welded to the wall of the carton. Examples of these types of containers and spouts are provided by U.S. Pat. No. 4,964,562 to Gordon and U.S. Pat. No. 4,601,425 to Bachner. Examples of these types of containers and spouts are also disclosed in U.S. Pat. No. 5,484,374 to Bachner et al., which is incorporated herein by reference.

The component of packaging machinery which attaches spouts to cartons is often referred to as an "applicator." One type of applicator operates in two distinct steps. First, before the carton is filled and sealed, the applicator inserts the spout through the die cut hole. The applicator then moves the carton to a second station, where an anvil is placed inside the carton to firmly hold the spout's flange against the carton wall. An ultrasonic sealer located outside the carton then welds the flange to the carton. Alternatively, a one-step applicator system, such as shown in U.S. Pat. No. 5,484,374 to Bachner et al., can be used to simultaneously insert and weld the spout.

With respect to gable-top cartons where a plastic [illegible] is welded to the carton surface, the current applic[illegible]art includes a sonic horn which may have an 'energy r[illegible]on the horn surface and a generally flat anvil surface (which is

or may be part of a rotating 'anvil housing') against which the horn presses to weld the spout flange to the carton surface. There is also typically a spout mandrel device, onto which the spout is placed, to move the spout from the 'saddle' (where the spout is positioned to be picked-up by the spout mandrel), and to position the spout within the aperture of the carton. This spout mandrel is secured to the anvil by means of a machine bolt. As the anvil component is the recipient of continuous pressure and vibration during the ultrasonic sealing process, the surface of the anvil can wear and produce uneven and poor welds.

In order to weld an 'inside-out-spout' to the carton surface, the ultrasonic horn with the energy ring must weld through the paperboard carton from the outside surface. The energy ring substantially compresses the paperboard as part of the welding process and, in so doing, can create ply bond delamination of the paperboard fiber and cause surface tearing. This same tearing can occur on the inside of the paperboard, which is laminated or extruded with a barrier material such as foil or polyethylene. Any tearing or pinholing of the inside barrier material will compromise the barrier properties of the carton. Also, by positioning the energy ring on the ultrasonic horn and welding through the paperboard thickness, the energy ring is positioned at its farthest distance from the bonding surfaces.

What would therefore be desirable is an ultrasonic welding device in which the energy ring is located on the anvil in close proximity to the surfaces or components to be welded in order to minimize the deleterious side-effects of ultrasonic welding with the energy ring on the ultrasonic horn. What would also be desirable is an anvil and mandrel component that can be readily removed from an anvil housing in order to facilitate rapid change out of the anvil and mandrel without replacing the entire anvil housing when spout configuration changes or when the energy ring has excessive wear.

SUMMARY OF THE INVENTION

To overcome the drawbacks of the prior art, an apparatus and method is provided for attaching reclosable spouts to containers such as cartons. In the preferred embodiment, an anvil is provided with an energy ring disposed on its surface in order to provide improved mechanical and processing control over the ultrasonic welding of reclosable spouts to containers, thereby improving the quality and reliability of the welding process and of the welded container.

The containers may have a heat-sealable lamination, which can be melted to weld the spouts to the containers. Because the containers are only partially formed, they have open tops which include a die cut opening (referred to herein as a "preformed hole") for receiving a spout. When the containers are ultimately filled, the open tops can be sealed, leaving the spout accessible to the user for conveniently dispensing liquids, powders and the like from the container.

In operation, partially formed containers are conveyed to the anvil which is adapted for inserting spouts into the containers' preformed holes and attaching the inserted spouts to the containers. The anvil housing preferably has a center portion that is adapted for rotation along an axis transverse to the conveyance direction. Preferably, the anvil housing has two or more lobes which extend radially at regular angular intervals from the center portion. Each lobe includes an anvil which may be fixedly or removably attached to the lobe. Fixedly or removably attached to each anvil is a mandrel for engaging a spout. On the anvil surface adjacent the mandrel is an energy ring configured to abut the

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mounting flange of the spout when the spout is inserted into the preformed hole in the container for welding. A spout delivery system sequentially positions the spouts for serial engagement by the mandrels, for example, in between indexed movements of the conveyor. To engage a spout, the mandrel is inserted into the spout so that the spout fits over the mandrel with the spout's annular flange flush against or in close proximity to the energy ring of the anvil surface.

As the conveyor moves containers past the anvil housing, a drive mechanism or like device rotates the anvil housing to sequentially position a mandrel and an adjacent anvil and energy ring inside each of the passing containers. The rotational motion of the anvil housing is synchronized with the indexed operation of the conveyor. Thus, upon completion of each indexed conveyor movement, a mandrel is aligned with the container's hole for inserting a spout into the hole.

After the mandrel is aligned with a container's hole, a rotating and translating mechanism having, for example, a mechanical or pneumatic drive imparts a first translation motion to the anvil housing to cause the mandrel (and the spout thereon) to be inserted into the hole. As the first translational movement inserts the spout into the hole, the energy ring surface adjacent the mandrel presses the spout's annular flange against the inner container wall. An ultrasonic sealer then ultrasonically vibrates the container in the region of the hole. Due to the pressure exerted upon the spout flange by the anvil energy ring, the ultrasonic energy is generally focused by the ring onto the spout flange and adjacent laminate, causing the heat-sealable laminate to melt, thereby welding the spout's flange to the inner wall of the container.

The translational drive means also provides a second translation motion to withdraw the mandrel from the container hole after the ultrasonic sealer has welded the spout to the container. Because the spout is attached to the container, the withdrawal of the mandrel leaves the spout secured to the container, and leaves the mandrel available to accept another spout from the spout feed system.

Placing the energy ring onto the anvil instead of the ultrasonic horn facilitates bonding between the flange and carton surfaces. This enables a weld sequence to occur with less weld time and horn energy than when the energy ring is located on the ultrasonic horn. Since the energy ring is in contact with the plastic spout flange, and since the ultrasonic horn may now be machined with a flat surface (which contacts, for example, the outside surface of the paperboard container), ply bond delamination, tearing and pin-holing of the paperboard, inside and outside, are minimized. In the preferred embodiment, the spout mandrel and sealing anvil surface with the energy ring may be manufactured as a one-piece component. If the anvil surface or energy ring should wear from use, the part may be easily machined, or eventually replaced with minimal expense. Where the spout mandrel and sealing anvil surface are manufactured as a one-piece component, this part of the 'anvil housing' assembly, may be easily changed to accommodate another spout design, often without changing the ultrasonic horn. Alternatively, the anvil surface and the spout mandrel can be separately manufactured and subsequently assembled together.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top plan view of a paperboard blank;

FIG. **2** is a perspective view of a partially formed carton;

FIG. **3** is a perspective view of a completely formed carton;

FIG. **4** is an exploded side view of a spout;

FIG. **5** is a perspective view of an applicator system;

FIG. **6** is a front view of the rotary anvil of FIG. **5**;

FIG. **7** is a side view of the applicator system of FIG. **5**;

FIG. **8** is a partial top view of the applicator system of FIG. **5**;

FIG. **9** is a partial sectional view of the applicator system of FIG. **8** taken along the lines **26**—**26** at a first point in time;

FIG. **10** is the partial sectional view of FIG. **9** at a second point in time.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The specific function of applicator **14** (FIG. **5**) is to attach a spout **34** to each of partially formed cartons **30**. FIG. **1** is a top plan view of one of the paperboard blanks **26**. Blank **26** is conventional, and for clarity is shown completely unfolded.

As is well known, the paperboard of blank **26** is laminated with heat-sealing plastic. One side of the blank may also be laminated with barrier material such as metal or other material. When folded by a rotary carton forming station (not shown), panels **36**, **38**, **40** and **42** form sidewalls of partially formed carton **30**, as illustrated in FIG. **2**. When sealed by the sealing station (not shown), panels **44** and **46** form the angled sides of a gabled top, as illustrated in FIG. **3**.

Referring to FIGS. **1**, **2** and **3**, a die cut hole **48** is formed completely through panel **44** for snugly receiving one of spouts **34**. FIG. **4** is an exploded side view of one of spouts **34**. Each of conventional spouts **34** is a plastic cylinder **50** having a flanged end **52** for mounting to partially formed carton **30**. The end **53** of cylinder **50** is threaded for receiving a removable cap **54**. As discussed below in greater detail, spout **34** is inserted from the interior of partially formed carton **30** so that threaded end **53** of spout **34** extends outwardly from panel **44**, and mounting flange **52** is flush against the interior side of panel **44**. It is understood that spout **34** is described by way of example and that the invention also contemplates the use of other types of fitments including hatches and the like.

As shown in FIG. **5**, the applicator system comprises a rotary anvil housing **184** and an ultrasonic sealer **186**. As explained below in detail, the rotating anvil housing **184** picks up one of spouts **34** from escapement **140** and transfers it in a rotary motion indicated by the arrow A to the inside of one of partially formed cartons **30**. Once inside the carton **30**, the anvil housing **184** moves in a translational motion indicated by the arrow B to insert the spout **34**, capped-end first, through the die cut hole **48** and to press mounting flange **52** flush against the interior side of panel **44** of the partially formed carton and also against energy ring **209** (FIG. **6**). Concurrently, the ultrasonic sealer **186** ultrasonically vibrates the periphery of the hole **48**, thus heating the heat-sealable plastic laminate adjacent to mounting flange **52**, thereby welding the mounting flange to the interior wall of the carton. Rotary anvil housing **184** and its associated anvil **207** and energy ring **209** must be of sufficient strength to withstand this welding process. To better understand the operation of applicator system **14**, the structure and function of its components are discussed below in detail.

Referring to FIGS. **6** and **7**, rotary anvil housing **184** is of metal and consists of a central disk portion **188** having front and rear parallel planar faces **190** and **192** (not shown), respectively. Preferably, three lobes **194** extend radially at

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120 degree increments from disk **188**. As will be explained, more or fewer lobes **194** may be used. Each lobe is of a width somewhat larger than the diameter of mounting flange **52** of spout **34**. Each lobe has a front face **196** which may, but need not be, coplanar with the front face **190** of central disk portion **188**.

Rotary anvil housing **184** is mounted for rotational and axial translational motion on a shaft **200**, which is centrally mounted on the rear side of central disk portion **188** as best seen in FIGS. **7** and **8**. Shaft **200** is mounted in a conventional drive source **204** suitable for imparting periodic rotational and translational motion to the anvil housing **184**. For example, the drive source may be mechanical, pneumatic or hydraulic. Preferably, drive source **204** is mounted to housing **18** on one side of carton conveyor **32** so that the end **206** of shaft **200** remote from the drive source **204** extends transversely over carton conveyor **32**, and at a height above conveyor **32** so as not to interfere with the passing of partially formed cartons **30**. Because end **206** of shaft **200** extends only about half way across carton conveyor **32**, the anvil housing **184** (which is mounted on end **206**) is suspended above the partially formed cartons **30** passing past shaft **200** on conveyor **32**. Shaft **200** imparts axial translational motion to anvil housing **184** by moving toward and away from conveyor **32** to insertion and retraction positions respectively. Normally, shaft **200** remains in the retraction position.

Referring to FIGS. **5–7**, disposed on the front face **196** of each lobe **194** is an anvil **207** and a mandrel **208**. The mandrel **208** can either be machined on the anvil **207** surface or secured to the anvil surface by means of a machine bolt (not shown). Likewise, each anvil or anvil/mandrel combination can either be machined as an integral part of the anvil housing **184** or, preferably, can be secured to the anvil housing by means of a machine bolt **213**, threaded assembly or press fit to facilitate removal from the anvil housing. Although the present invention is not so limited, the anvil may be manufactured from a hard metal, such as stainless steel, and the spout mandrel manufactured from an energy absorbing material such as a urethane or rubber. By so doing, one may selectively prevent the transfer of energy to specific areas or physically contact the area or part that needs to be dampened from vibrations.

Each anvil **207** has configured thereon, and extending a predetermined perpendicular distance from the front face of the anvil, an energy ring **209**. The mandrel **208** also extends perpendicularly from the front face of the anvil. Preferably, each anvil **207**, as well as its associated mandrel **208** and energy ring **209**, is located near the tip **210** of its respective lobe **194**, at exactly the same distance from the center point **211** of central disk portion **188**. Preferably each mandrel **208** is cylindrical in shape, and is of a length and diameter so as to snugly fit inside the cylindrical portion **50** of each spout **34** and, thereby, maintain the relative positions of the spout and mandrel when the mandrel is inserted into the spout. Likewise, energy ring **209** is preferably shaped to conform to the shape of mounting flange **52** of spout **34**.

Ultrasonic sealer **186** is a known, commercially available device. It is mounted to housing **18** in any suitable manner so that it is positioned on the side of conveyor **32** opposite drive source **204**. Ultrasonic sealer **186** includes a hollow cylindrical horn **212** in a horizontal orientation. The longitudinal axis of horn **212** is perpendicular to the plane of anvil housing front face. Horn **212** is capable of translational motion toward and away from anvil housing **184** by means of a conventional drive source (not shown).

Of importance is the timing and positioning of the rotary anvil housing **184**, the ultrasonic sealer **186**, the partially formed cartons **30**, and the escapement **140**. Reference is made to FIG. **8**, which is a top view of the applicator **14** showing partially formed carton **30** directly under anvil housing **184**. It will be appreciated from the foregoing description that the rotary anvil housing **184** is suspended above conveyor **32** with the front face **196** of each lobe **194** parallel to the direction of carton conveyor **32** and facing toward the ultrasonic horn **212**. In the illustrated embodiment, carton conveyor **32** is moving partially formed cartons **30** toward the filling station **22** so that the panel **44** containing hole **48** is also parallel to the front face **196** of each lobe **194**.

As mentioned, conveyor **32** is conventionally indexed to periodically move cartons **30** a predetermined distance. With each index of the conveyor **32**, the partially formed cartons **30** are sequentially moved into a position centered directly under anvil housing **184** as shown in FIG. **5**. Concurrently with the indexed movement of the conveyor **32**, the shaft **200** imparts 120 degrees of rotational motion (indicated by the arrow **214** in FIG. **6**) to the anvil housing **184**. The anvil housing **184** is mounted on shaft **200** so that this rotational motion leaves the anvil housing **184** in a position (the "anvil housing operating position") with one lobe **194**, and its respective anvil, mandrel and energy ring, extending directly vertically downward, and the other two lobes **194**, and their respective anvils, mandrels and energy rings, extending outward.

After the conveyor **32** has been indexed and anvil housing **184** has been rotated 120 degrees to the next anvil housing operating position, the downwardly extending one of lobes **194** will be positioned in the interior of a partially formed carton **30**, as best seen in FIG. **7**. At this point in time, shaft **200** remains in its retracted position. The length of shaft **200** is selected so that the front face **196** of downwardly extending lobe **194** is suspended in parallel spaced relation to panel **44**, as best seen in FIG. **7**. Preferably, mandrel **208** is spaced from the center point **211** so that it is exactly aligned for insertion into hole **48** when its respective lobe **194** is inside the cartons **30**, as indicated by FIGS. **7** and **8**.

Referring to FIGS. **5** and **8**, it will be observed that escapement **140** is positioned so that when anvil housing **184** is in the anvil housing operating position, one of the lobes **194** extends behind the escapement **140** so that its mandrel **208** is vertically and horizontally aligned for insertion into the cylinder **50** of one of spouts **34** which has been dropped into escapement **140**. Likewise, anvil **207** and energy ring **209** are vertically and horizontally aligned such that when the mandrel **208** is aligned for insertion into cylinder **50**, energy ring **209** is aligned to abut mounting flange **52**.

Thus, the rotary anvil housing **184** initially has one mandrel **208** and energy ring **209** aligned with one of the unattached spouts **34** in escapement **140**, and another mandrel **208** aligned with the hole **48** in panel **44** of the partially formed carton **30** which the carton conveyor **32** has moved underneath the anvil housing **184**. In a manner described below, one of unattached spouts **34** has already been placed on mandrel **208**.

Next, shaft **200** moves into its insertion position, imparting an axial translational movement to anvil housing **184**. This translational motion causes mandrel **208** to be inserted into spout **34** resting in escapement **140**. Mandrels **208** are sized to fit snugly inside the cylinders **50** of spouts **34** such that when insertion is completed, energy ring **209** abuts mounting flange **52**. Thus, when mandrel **208** is inserted into spout **34**, mandrel **208** engages the interior walls of the spout

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34 with a friction of force fit and energy ring 209 presses flush against mounting flange 52. Because mounting flange 52 is flush against the rearward walls (shown) of escapement 140, spout 34 remains stationery against this force, and mandrel 208 is inserted therein by the aforementioned translational movement.

Subsequently, mandrel 208 (and the spout 34 into which mandrel 208 has been inserted) is inserted into hole 48, as best seen in FIG. 10. Thus, the capped end 54 of spout 34 is inserted through the hole 48 and extends outwardly from panel 44. The aforementioned translational motion moves lobe 194 forward so that its front surface 196 pushes mounting flange 52 flush against the interior side of carton panel 44.

While shaft 200 remains in this insertion position, ultrasonic sealer 186 moves an ultrasonic welding horn 212 toward carton 30 to engage a doughnut-shaped region 216 of panel 44 (See FIG. 2) which surrounds hole 48 and superimposes mounting flange 52 which is frictionally disposed between energy ring 209 and the heat-sealable plastic laminate adjacent to the mounting flange 52. Welding horn 212 then ultrasonically vibrates region 216, the ultrasonic energy being focused on mounting flange and adjacent laminate by energy ring 209. As a result, the heat-sealable plastic laminate adjacent to the mounting flange 52 is heated and melted, thereby welding the mounting flange to the interior side of panel 44. By focusing the ultrasonic energy on the mounting flange and adjacent laminate, weld time and horn energy are minimized, thus eliminating the delamination, tearing and pin-holing of the container that would otherwise occur.

Upon completion of the welding process, the ultrasonic sealer 186 retracts to its original position, as show in FIG. 9. At the same time, mandrel 208 is retracted from spout 34 and hole 48. Notwithstanding the presence of friction forces acting on spout 34, spout 34 remains in hole 48, permanently attached by virtue of the spout's welded mounting flange 52. In this manner, the spout 34 has been effectively attached to panel 44 of carton 30.

In operation, it is important to position the energy ring in close proximity to the surfaces which are to be sealed together. If the energy ring is not in close proximity to the seal points, random energy (sometimes referred to as sympathetic energy) is transmitted to other portions of the materials which are touched, directly or indirectly, by the ultrasonic horn. This random energy may be transmitted in harmonic cycles to the immediate materials, such as the paperboard and plastic cap, and also the machine parts, such as the anvil, anvil housing, the anvil housing shaft (which rotates the anvil housing), and even into portions of the machine. Placing the energy ring in close proximity to the weld surfaces maintains or concentrates the ultrasonic energy onto the seal area and, thereby, minimizes the amount of time and pressure required to effect the seal. Such energy ring placement also minimizes the transfer and impact of this random energy.

In operation, placement of the energy ring in close proximity to the surfaces to be sealed together is especially important where, for example, a plastic wall section is intentionally thin, to provide a line-of-weakness for facilitating the removal of an inner membrane part. If the energy ring is not placed in close proximity to the surfaces to be sealed, the ultrasonic energy will not be effectively focused on that part. Instead, the ultrasonic energy will travel along the surface of the plastic part and concentrate at the thin wall section, thereby causing that section to heat and separate from, for example, an adjacent thick wall section. This phenomena, known as "de-gating," can cause the inner membrane to prematurely separate and cause container spouts to leak undesirably. Unlike conventional ultrasonic systems having an energy ring on the horn, the present invention, having an energy ring on the anvil and, thus, in close proximity to the part to be sealed, now permits sensitive spout constructions, such as those incorporating thin wall sections, to be sealed.

While the invention has been described with respect to the preferred embodiments, variations modifications, substitutions and alternatives will be apparent to those skilled in the art and accordingly, the scope of the invention should be defined by the appended claims and equivalents thereof.

What is claimed is:

1. An apparatus for attaching to the interior surface of a container wall a spout having a flange on one end thereof, the container having a preformed hole adapted for receiving the end of the spout opposite the flange, said apparatus comprising:

(a) an anvil housing having an anvil and a mandrel projecting from said anvil, said mandrel being adapted to receive a spout for attachment to a container, said anvil having a raised annular surface substantially surrounding said mandrel for contacting a first surface of the flange of a spout positioned on said mandrel;

(b) drive means for engaging the flanged end of the spout on said mandrel and positioning said anvil housing such that said mandrel and the end of the spout opposite the flange project through the preformed hole of the container with the surface of the flange opposite the first surface positioned adjacent to the interior surface of the container; and

(c) sealing means for securing the flange of the spout to the interior surface of the wall of the container, said sealing means having a surface for contacting the exterior surface of the wall of the container in proximity to said at least one anvil such that the wall of the container and the flange of the spout are sandwiched between said raised annular surface on said anvil and said surface of said sealing means, wherein said sealing means causes the flange to be fused to the interior surface of the wall of the container.

2. The apparatus of claim 1 wherein said sealing means further comprises an ultrasonic sealer whereby ultrasonic vibration causes heating of the wall of the container and fusing of the flange of the spout to the wall of the container.

3. The apparatus of claim 1 wherein said anvil housing further comprises a plurality of anvils, each said anvil having a mandrel projecting therefrom for receiving a spout for attachment to a container, each said anvil having a raised annular surface substantially surrounding one of said mandrels, and wherein said drive means further comprises means for positioning sequentially each of said plurality of anvils in successive containers, whereby a spout is positioned for attachment to each container.

4. The apparatus of claim 1 wherein said anvil is removably attached to said anvil housing.

5. The apparatus of claim 4 wherein said mandrel is fixedly attached to said anvil.

6. The apparatus of claim 1 wherein said mandrel is removably attached to said anvil.

7. The apparatus of claim 1 wherein the raised annular surface of said anvil has a cross-section that is narrower than the width of the flange.

8. An apparatus for attaching a spout having a flange to a preformed hole in a container wall, said apparatus comprising:

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an anvil having a raised annular surface disposed thereon for contacting the flange;

a mandrel disposed on said anvil for positioning the spout in the preformed hole with the spout flange between said raised annular surface and the interior surface of the container wall; and

an ultrasonic sealer having a horn engagable with the exterior surface of the container wall such that, when so engaged, vibration of said horn vibrates the interior surface of the wall of the container against the flange and the flange against said raised annular surface, whereby the interior surface of the wall of the container is heated so as to fuse the flange to the wall of the container.

9. An apparatus for attaching a spout having a flange to the interior surface of a container wall having a preformed opening adapted to receive the spout, said apparatus comprising:

a housing;

an anvil movably mounted on said housing and having a mandrel adapted to hold a spout for attachment to the container wall, said anvil having a raised annular surface for contacting a first surface of the flange of a spout held by said mandril, said anvil and mandrel being movable between an unengaged position and an engaged position, wherein in the engaged position said anvil is positioned such that a second surface of the flange opposite the first surface is adjacent the interior surface of the container wall;

a horn movable between an engaged position and an unengaged position, wherein in the engaged position said horn is positioned adjacent the exterior surface of the container wall; and

an ultrasonic sealer having a vibrating horn, wherein when said horn and said anvil are in the engaged position said horn is pressed against the exterior surface of the container wall and the interior surface of the container wall in turn is pressed against the second surface of the flange, and the first surface of the flange is pressed against the raised annular surface on said anvil, whereby the vibration of said horn causes the second surface of the flange to become fused to the interior surface of the container.

10. A method for attaching a spout having a flange to the interior surface of a container wall having a preformed opening adapted to receive the spout, said method comprising:

engaging a spout onto a member adapted to receive a spout and having a raised annular surface, the flange of the spout being positioned over said raised annular surface;

aligning the preformed hole and the spout engaged on said member, with the spout facing the interior surface of the container wall;

changing the position of said member with respect to the preformed opening so as to cause the spout to protrude through the preformed opening with the flange abutting against the interior surface of the container;

pressing the wall of the container against the flange and the flange against said raised annular surface so as to attach the flange to the wall of the container;

causing said member to be withdrawn from the spout; and

causing said member to be withdrawn from the interior of the container.

11. The method of claim **10** wherein said step of pressing the wall of the container against the flange further comprises heating the wall of the container in the vicinity of the flange while the wall and flange are pressed against said raised annular surface to cause the flange to become fused to the interior surface of the wall of the container.

12. The method of claim **10** wherein said member is an anvil.

13. The method of claim **10** wherein said member is a horn on an ultrasonic sealer.

14. An anvil for supporting at least two layers of material against an ultrasonic sealing horn wherein said anvil has a raised annular surface for contacting a surface of one of said layers, whereby energy imparted to said layers is concentrated in the vicinity of said raised annular surface.

15. An apparatus for attaching a spout having a flange to a preformed hole in a container wall, said apparatus comprising:

an anvil having a raised annular surface disposed thereon for contacting the flange;

a mandrel disposed on said anvil for position the spout in the preformed hole with the spout flange between said raised annular surface and the interior surface of the container wall; and

a member having a surface engageable with the exterior surface of the container wall such that, when so engaged, the interior surface of the container wall is pressed against the flange and the flange against said raised annular surface, whereby the flange becomes fastened to the interior surface of the container wall in the vicinity of said raised annular surface.

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,085,489

DATED : July 11, 2000

INVENTOR(S) : Jerry G. Bachner and Michael A. Kipp

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 27, delete "device in" and insert -- device is -- (Patent Application page 3, line 12);

Column 7, line 3, delete "(shown)" and insert -- (not shown) -- (Amendment dated December 15, 1999, page 2, line 2);

Please add a lead line to numeral 209 in FIG. 6 as shown in red in the accompanying drawing.

Column 7, line 4, delete "stationery" and insert -- stationary -- (Patent Application page 12, line 6).

Signed and Sealed this

First Day of May, 2001

Attest:

Nicholas P. Godici

NICHOLAS P. GODICI

Attesting Officer

Acting Director of the United States Patent and Trademark Office

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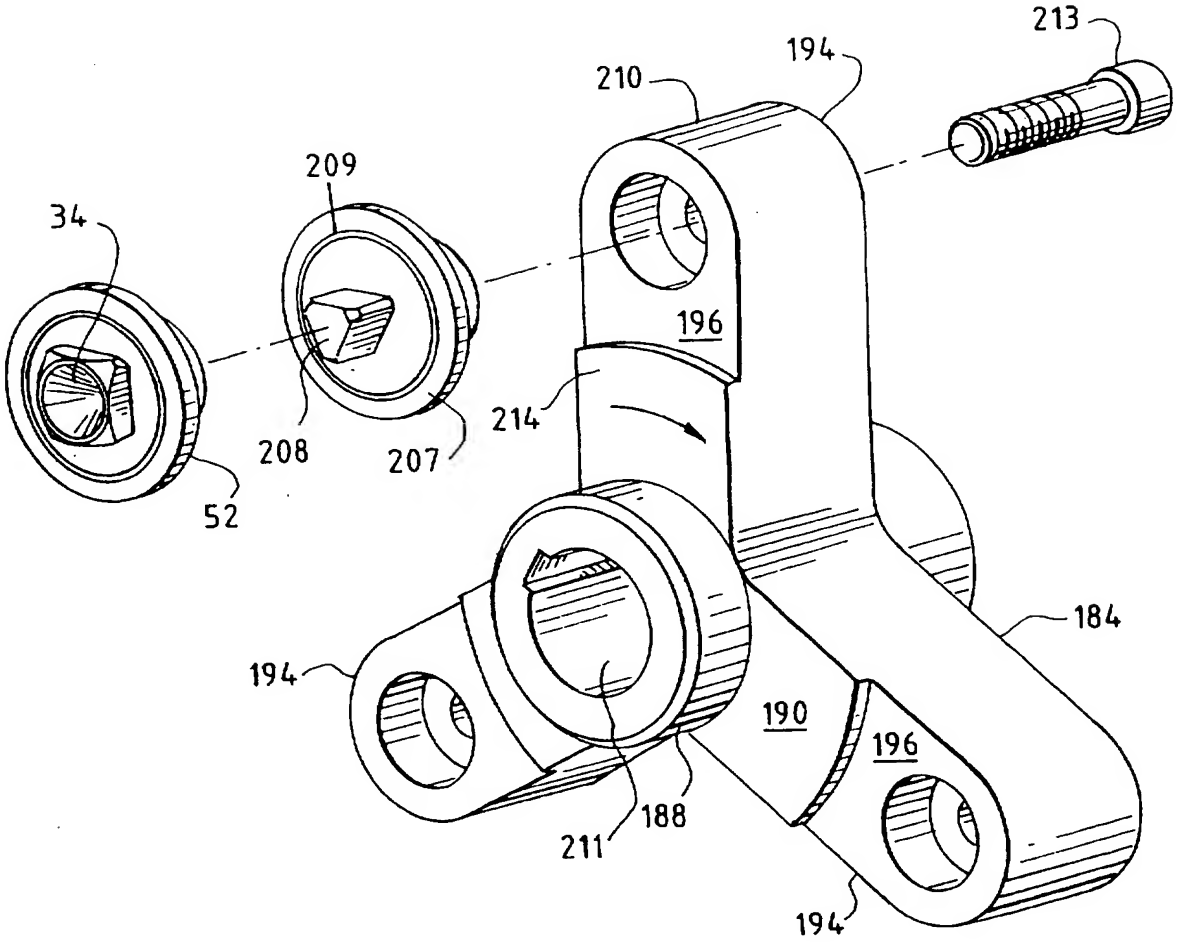
FIG. 6



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